State of California

Business, Transportation and Housing Agency

Memorandum

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To: MR. MAJID MADANI
Senior Bridge Engineer
Division of Structure Design MS 9-4/5J
Office of Bridge Design - South
Design Branch 14

Attention: John Lane

Date: April 10, 2002

File: 11-SD-15-M17.8
11-064801
Los Penasquitos Creek
Right Bridge (Widen)
Bridge No. 57-0106R

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services – MS 5
Office of Geotechnical Design - South

Subject: Preliminary Foundation Recommendations

In a Memorandum dated December 14, 2001, the Division of Structure Design, Office of Bridge Design Branch 14 has requested for a Preliminary Foundation Recommendations (PFR) for the proposed widening of the existing Los Penasquitos Creek (Right) Bridge. Our Office has evaluated the site conditions and geology based on existing As-Built Plans and As-Built Log of Test Borings. Additional field investigation was not performed for the Preliminary Foundation Recommendations.

Resources used for the Preliminary Foundation Recommendations were based on the following references:

- As-Built General Plan, Foundation Plan, Pier Details Plan and Log of Test Borings dated May 5, 1975 for the right bridge.
- Original Foundation Recommendations for the Los Penasquitos Creek Bridge (Replace) prepared by W.C. Cain dated April 25, 1974.
- Preliminary Geologic Recommendations and Resources Estimate for Advance Planning Study for the Los Penasquitos Creek (Right) Bridge prepared by M. Luqman of the Structure Foundations Branch dated December 9, 1998.
- Preliminary Geologic Recommendations and Resources Estimate for Advance Planning Study for the Los Penasquitos Creek Left & Right Bridge (Widening) prepared by L. Paredes-Mejia of the Office of Structure Foundations dated September 11, 2000.
- Planning Study Plan for the Los Penasquitos Creek Bridge (Widen) dated 05/21/01 prepared by Structure Design Section 15.

Geology

According to the Original Foundation Report and As-Built Log of Test Borings (LOTBs) as stated above, the proposed widening structure transverse a small canyon occupied by the Los Penasquitos Creek. The canyon has relatively steep sides and a bottom floor that is relative flat. The site is partially covered by approach embankment material consisting of compact to very dense admixtures of silt, sand, clay, gravel, rock fragments with scattered of cobbles and boulders. It is estimated the embankment fill to be 12.2 meters at abutment 1 and 19.5 meters at abutment 7. The material on the canyon floor is composed of a mixture of alluvial and colluvial material consisting of dense to very dense silty, gravelly sand, sandy gravel with scattered of boulders and organic matters. The alluvium is underlain by weathered, decomposed granitic bedrock grading to very dense highly fractured jointed granitic bedrock.

Groundwater

According to the As-Built Log of Test Borings dated May 5, 1975, groundwater surface was encountered and measured at elevation 295.2 ft (89.97 meters) on 10-05-72 in boring B-3. Groundwater surface was not encountered at other boring locations shown on the As-Built Log of Test Borings.

Seismic Data and Evaluation

The Preliminary Seismic Design Recommendations were provided by the Geotechnical Earthquake Engineering Section (GEES). According to GEES Memo prepared by R. Mahallati dated November 16, 1998, "The controlling fault for the site is Newport Ingledwood with a maximum credible earthquake of Mw=7 and is located about 16.5 km west of the site. The peak horizontal bedrock acceleration at this site, based on attenuation equation by Sadigh 1993, is estimated to be 0.3g. Preliminary ATC-32 Acceleration Response Spectrum (ARS) corresponding to soil profile Type D is recommended for Abutments 1 and 7; and along the bents, ATC-32 curve corresponding to Soil Profile Type B was recommended." A copy of this memo is provided for reference.

Liquefaction Evaluation

Assessment of potential for liquefaction at the proposed widening structure was performed by the Geotechnical Earthquake Engineering Section (GEES). According to the Preliminary Seismic Design Recommendation Memo prepared by H. Salimi (GEES) dated November 23, 1998 for the Los Penasquitos Creek "Left" Bridge (Bridge No. 57-0106L), there is no potential for liquefaction at the above reference structure. A copy of this memo is provided for reference.

Scour Evaluation

The scour evaluation was performed by M. Palmer of the Geotechnical Services, Office of Geotechnical Support (Scour Critical Program). According to the Email Memo dated 03/15/2002, "Scour will not be a problem for these support locations (refer to Piers 3, 4, and 5). A copy of this memo is provided for reference.

Corrosion Evaluation

Corrosion evaluation for the proposed widening structure will be provided in the Final Foundation Recommendations. As previously stated, additional foundation investigation was not performed for the Preliminary Foundation Recommendations (PFR).

Preliminary Foundation Recommendations

According to the As-Built General Plan dated May 5, 1975, existing abutments 1 and 7 are supported by spread footing founded on embankment fill material (95% R.C. compacted embankment). The allowable bearing pressure for the footings at the abutments is 191.52 kPa (2 Tsf). Piers 2 through 6 are consisted of 2.4x3.7m (8x12 ft) Pier Columns (column shafts). Tables 1 and 2 present the As-Built Conditions for the Right Structure.

Table 1
Existing Foundation Data

Location	Foundation Type	Bottom of Footing Elevation [1] m (ft)	Allowable Bearing Pressure [2] kPa (Tsf)
Abutment 1 Right Cap	Spread Footing	126.03 (413.5)	191.52 (2)
Abutment 1 Left Cap	Spread Footing	126.15 (413.9)	191.52 (2)
Abutment 7 Right Cap	Spread Footing	119.75 (392.9)	191.52 (2)
Abutment 7 Left Cap	Spread Footing	120.09 (394.0)	191.52 (2)

Notes:
1) Bottom of Footing Elevation obtained from As-Built Foundation Plan No. 1 dated May 5, 1975.
2) Allowable bearing pressure obtained from APS-PGR Memo dated December 9, 1998.

Table 2
Pile Data Table for the Existing Right Bridge

Location	Pile Type 2.4x3.7m (8x12 ft) Pier Column (Shaft)	Design Load [1] kN (kips)	Cut-Off Elevation [2] m (ft)	Bottom of Pier Shaft Elevation [3] m (ft)
Pier 2	Left	6943.3 (1561)	108.2 (355)	99.1 (325)
	Center	6943.3 (1561)	108.5 (356)	99.1 (325)
	Right	6943.3 (1561)	108.8 (357)	99.1 (325)
Pier 3	Left	8255.5 (1856)	95.4 (313)	82.0 (269)
	Center	8255.5 (1856)	95.7 (314)	82.0 (269)
	Right	8255.5 (1856)	96.0 (315)	82.0 (269)
Pier 4	Left	8794.8 (1975)	90.5 (297)	80.8 (265)
	Center	8794.8 (1975)	90.5 (297)	80.5 (264)
	Right	8794.8 (1975)	90.5 (297)	79.9 (262)
Pier 5	Left	7944.1 (1786)	N/A	90.8 (298)
	Center	7944.1 (1786)	104.2 (342)	87.8 (288)
	Right	7944.1 (1786)	101.5 (333)	84.4 (277)
Pier 6	Left	7228 (1625)	119.2 (391)	99.1 (325)
	Center	7228 (1625)	115.2 (378)	93.0 (305)
	Right	7228 (1625)	108.8 (357)	88.1 (289)

Notes:
1) Design Loads obtained from APS-PGR Memo dated December 9, 1998.
2) Cut-Off Elevations obtained from As-Built Pier Details sheet dated May 5, 1975.
3) Bottom of Pier Shaft Elevations obtained from As-Built Foundation Plan Nos. 1 and 2 dated May 5, 1975.

Preliminary Foundation Recommendations for the proposed right bridge widening

The proposed Abutments 1 and 7 can be supported by spread footings. Bottom of footing elevations and abutment widths are required to analyze and evaluate for the final foundation recommendations. 191.52 kPa (2 Tsf) allowable bearing pressure can be utilized if footing width and bottom of footing elevation match existing As-Built conditions. The proposed abutment footings should be founded in 95% R.C. compacted embankment in order to utilize the above recommendations.

The proposed Piers 2 through 6 can be supported by large diameter Cast-In-Drilled-Hole (CIDH) piles. According to the Planning Study dated 05/21/01 prepared by Structure Design Section 15, the proposed widening for the right bridge consists of 2.44x2.44 m (square) single column for Piers 2 through 6. As per the preliminary design layout, we're recommending to use rounded-CIDH for portion below cut-off elevation for ease of construction. One important aspect of the rounded-CIDH piles is that temporary casing might be required to prevent caving and sloughing of material during the installation of CIDH piles for Piers 2 through 6.

Group effects will need to be evaluated for Piers 2 through 6 pertaining to the proposed and existing right columns. Based on the Planning Study Layout dated 05/21/01, center-to-center distance from the existing right shaft to proposed shaft will be 1 to 1.75 diameter. Clear spacing from edge of shaft to edge of shaft will be approximately 1.22 m (4 ft). As a result, axial capacity for the proposed and existing right shaft will be reduced due to group effects.

Lateral analysis will need to account for shadow effects (group effects) due to the tight spacing in the transverse direction (refer to the proposed and existing right column/shaft for Piers 2 through 6).

Additional Field Investigation

To verify the geologic conditions of the foundation materials, it is recommended that one to two 30.5 meters (100 ft) rotary borings be completed at the proposed support locations. The additional field investigation (drilling) will provide information pertaining to the geology (detail descriptions of bedrock "rock" conditions), provide present groundwater surface information for the design and construction procedures for the CIDH piles. Furthermore, the updated data can be utilized to provide corrosion and seismic analyses.

A request for final foundation recommendations should include Foundation and General Plans for the proposed bridge widening. The District Project Manager should be aware that several permits may be required to commence drilling and should plan to consider time required by the district to obtain permits. Permits such as road closure, Fish and Game permits, permits to be on private property (if required), utility clearance, and any other environmental issues/permits may be required for drilling at the site, and in the district/county. If a site hazardous assessment report for soil and groundwater contamination is available, it should be communicated to our office before any drilling starts.

Estimated Structure Foundation Branch Time and Duration Required

The following resource estimate is issued pursuant to "Memo To Designers" I-35 (revised 3/98). The estimated time and duration are based upon the following assumptions:

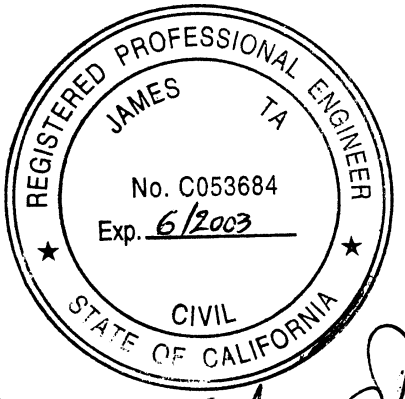
1) The Division of Structure Design will provide all information required by the Structure Foundations Branch B - South to complete evaluation.
2) The Department will provide the appropriate resources (funding, staff and equipment) for the project.
3) The District will provide the necessary permits and clearance for drilling in this County.

Table 3: Resource Estimate

Request Type	OGD-S Estimated Hours [1]	OGD-S Estimated Duration [1]
FR (WBS 215)	500	12 weeks

Note: 1) The estimated hours and estimated duration was obtained from the Preliminary Geologic Recommendations and Resources Estimate for Advance Planning Study prepared by M. Luqman dated December 9, 1998.

Any questions regarding the above recommendations should be directed to the attention of James Ta (916) 227-5389 (CALNET 498-5389) or Muhammad Luqman (916) 227-5390.



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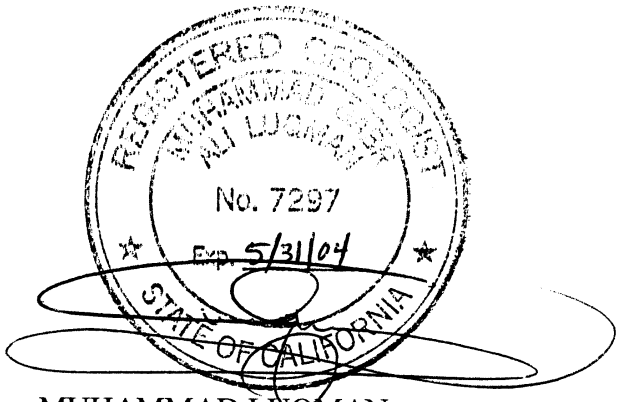


MUHAMMAD LUQMAN
Senior Engineering Geologist, R.G. 7297
Structure Foundations Branch B - South

c: James Chai – OGD-South
Gustavo Hernandez (APCE)
RGES.29
Bridge File

State of California **Business, Transportation and Housing Agency**

Memorandum

Flex your power!
Be energy efficient!

To: MR. MAJID MADANI
Senior Bridge Engineer
Division of Structure Design MS 9-4/5J
Office of Bridge Design - South
Design Branch 14

Attention: John Lane

Date: April 15, 2002

File: 11-SD-15-M17.8
11-064801
Los Penasquitos Creek
Left Bridge (Widen)
Bridge No. 57-0106L

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services – MS 5
Office of Geotechnical Design - South

Subject: Preliminary Foundation Recommendations

In a Memorandum dated December 14, 2001, the Division of Structure Design, Office of Bridge Design Branch 14 has requested for a Preliminary Foundation Recommendations (PFR) for the proposed widening of the existing Los Penasquitos Creek (Left) Bridge. Our Office has evaluated the site conditions and geology based on existing As-Built Plans and As-Built Log of Test Borings. Additional field investigation was not performed for the Preliminary Foundation Recommendations.

Resources used for the Preliminary Foundation Recommendations were based on the following references:

- As-Built General Plan, Foundation Plan and Log of Test Borings dated July 29, 1963 for the original left structure.
- As-Built General Plan, Foundation Plans and Log of Test Borings dated May 21, 1973 for the widening of the West Side of the existing left structure.
- As-Built General Plan, Foundation Plans and Log of Test Borings dated August 7, 1984 for the widening of the East Side (median) of the existing left structure.
- Original Foundation Recommendations (Report) for the Los Penasquitos Creek Bridge prepared by S. L. Champlin dated January 15, 1963.
- Foundation Recommendations (Report) for the Los Penasquitos Creek Bridge (Widen) prepared by W. C. Cain dated October 30, 1972.
- Preliminary Geologic Recommendations for the Los Penasquitos Creek (Left) Bridge prepared by F. Gerami of the Office of Structural Foundations dated December 22, 1994.
- Preliminary Geologic Recommendations and Resources Estimate for Advance Planning Study for the Los Penasquitos Creek Bridge prepared by M. Luqman of the Structure Foundations Branch dated December 8, 1998.
- Planning Study for the Los Penasquitos Creek Bridge (Left Widen) dated 05/18/01 prepared by Structure Design Section 15.

Geology

According to the Original Foundation Report and As-Built Log of Test Borings (LOTB) listed above, the proposed widening structure transverses a small canyon occupied by the Los Penasquitos Creek. The canyon has relatively steep sides and a bottom floor that is relative flat. The site is partially covered by approach embankment material consisting of slightly compact to very dense admixtures of sand, silt, clay, gravel, rock fragments with scattered of cobbles. It is estimated the embankment fill to be 17 meters at Abutment 1 and 19.5 meters at Abutment 6. The steep hillsides consist of numerous outcrops of weathered granitic rock and are covered in part with 0.6 to 1.5 meters (2 to 5 feet) of colluvial material. The material on the canyon floor is composed of a mixture of alluvial and colluvial material consisting of dense to very dense gravelly, poorly sorted sand with abundant cobbles and boulders. The alluvium is underlain by weathered, partly decomposed granitic bedrock grading to very dense fractured and jointed granitic bedrock.

Groundwater

According to the As-Built Log of Test Borings, groundwater was encountered and measured at elevation 294.0 ft (89.61 m) on 11-15-62, and at elevation 293.2 ft (89.36 meters) on 9-26-72. Groundwater was not encountered at other boring locations shown on the As-Built Log of Test Borings. It should be noted that groundwater levels and surface flow are variable due to the hydrology of the steep hill and stream channel. The groundwater table may fluctuate due to seasonal variation.

Seismic Data and Evaluation

The Geotechnical Earthquake Engineering Section (GEES) provided the Preliminary Seismic Design Recommendations. According to GEES Memo prepared by H. Salimi dated November 23, 1998, "The controlling fault for the site is the Newport-Inglewood-Rose Canyon/E (NIE) with a maximum credible earthquake Mw=7 located approximately 16.7 kilometers west of the site. The Peak Bedrock Acceleration at this site, based on the attenuation equation by Sadigh, 1993, is estimated to be 0.3g. The geology of the site corresponds to soil profile type C of the ATC-32. The preliminary Acceleration Response Spectrum is shown on Figure 1." A copy of this memo is provided for reference.

Liquefaction Evaluation

The Geotechnical Earthquake Engineering Section (GEES) performed assessment for the potential of liquefaction at the proposed widening structure. According to the Preliminary Seismic Design Recommendation Memo prepared by H. Salimi (GEES) dated November 23, 1998 for the Los Penasquitos Creek "Left" Bridge (Bridge No. 57-0106L), there is no potential for liquefaction at the above reference structure. A copy of this memo is provided for reference.

Scour Evaluation

M. PALMER of the Office of Geotechnical Support (Scour Critical Program), Geotechnical Services, performed the scour evaluation. According to the e-mail Memo dated 03/15/2002, "Scour will not be a problem for these support locations (refer to Piers 3, 4, and 5)." A copy of this memo is provided for reference.

Corrosion Evaluation

Corrosion evaluation for the proposed widening structure will be provided in the Final Foundation Recommendations. As stated above, additional foundation investigation was not performed for the Preliminary Foundation Recommendations (PFR).

Preliminary Foundation Recommendations

Based on the data reviewed for this structure, the existing left bridge was constructed in different stages. The original bridge was completed in 1965. The left bridge is supported on spread footings at Abutments 1 and 6, and 2.4x3.7 m (8x12 ft) column/shaft footings at Piers 2, 3, 4 and 5. Tables 1 and 2 show the As-Built Conditions for the Original Left Structure.

Table 1
Foundation Data
Original Left Bridge (1965)

Location	Foundation Type	Bottom of Footing Elevation [1] m (ft)	Allowable Bearing Pressure [2] kPa Tsf)
Abutment 1	Spread Footing	129.84 (426.0)	191.5 (2)
Abutment 6	Spread Footing	125.11 (410.5)	191.5 (2)

Notes:
1) Bottom of Footing Elevations obtained from As-Built Foundation Plan dated July 29, 1963.
2) Allowable bearing pressure obtained from APS-PGR Memo dated December 8, 1998.

Table 2
Pile Data Table
Original Left Bridge (1965)

Location	Pile Type 2.4x3.7 m (8x12 ft) Pier Column (Shaft)	Design Load [1] kN (Tons)	Cut-Off Elevation [2] m (ft)	Bottom of Pier Shaft Elevation [3] m (ft)
Pier 2	Single Column	9785 (1100)	107.89 (354.0)	99.06 (325.0)
Pier 3	Single Column	9785 (1100)	89.91 (295.0)	82.29 (270.0)
Pier 4	Single Column	9785 (1100)	91.74 (301.0)	82.29 (270.0)
Pier 5	Single Column	9785 (1100)	103.93 (341.0)	96.01 (315.0)

Notes:
1) Design Loads obtained from APS-PGR Memo dated December 8, 1998.
2) Cut-Off Elevations obtained from As-Built Pier Details Sheet dated July 29, 1963.
3) Bottom of Pier Shaft Elevations obtained from As-Built Foundation Plan dated July 29, 1963.

Widening of the West Side (outside) of the existing original left bridge was completed in 1975. The widened portion of the bridge is supported on spread footings at Abutments 1 and 6, and 2.4x3.7 m (8x12 ft) column/shaft footings at Piers 2, 3, 4 and 5. Tables 3 and 4 show the As-Built Conditions for the widened structure (West Side).

Table 3
Foundation Data
Widened Structure - West Side (1975)

Location	Foundation Type	Bottom of Footing Elevation [1] m (ft)	Allowable Bearing Pressure [2] KPa (Tsf)
Abutment 1	Spread Footing	130.07 (426.75)	191.5 (2)
Abutment 6	Spread Footing	125.11 (410.50)	191.5 (2)

Notes:
1) Bottom of Footing Elevations obtained from As-Built Foundation Plans dated May 21, 1973.
2) Allowable Bearing Pressure obtained from APS-PGR Memo dated December 8, 1998.

Table 4
Pile Data Table
Widened Structure - West Side (1975)

Location	Pile Type 2.4x3.7 m (8x12 ft) Pier Column (Shaft)	Design Load [1] kN (Tons)	Cut-Off Elevation [2] m (ft)	Bottom of Pier Shaft Elevation [3] m (ft)
Pier 2	Two Columns	8807 (990)	109.27 (358.5)	99.06 (325)
Pier 3	Two Columns	9830 (1105)	90.22 (296.0)	82.29 (270)
Pier 4	Two Columns	9563 (1075)	92.05 (302.0)	82.29 (270)
Pier 5	Two Columns	9674 (1087.5)	106.22 (348.5)	96.01 (315)

Notes:
1) Design Loads obtained from APS-PGR Memo dated December 8, 1998.
2) Cut-Off Elevations obtained from As-Built Pier Details Sheet dated May 21, 1973.
3) Bottom of Pier Shaft Elevations obtained from As-Built Foundation Plans dated May 21, 1973.

Widening of the median of the original left bridge was completed in 1986. The widened portion of the bridge is supported on spread footings at Abutments 1 and 6, and 2.44 m (8 ft) diameter column shafts at Piers 2, 3, 4 and 5. Tables 5 and 6 show the As-Built Conditions of the median widening (East Side) of the existing original left bridge.

Table 5
Foundation Data
Widened Structure - East Side (1986)

Location	Foundation Type Spread Footing	Bottom of Footing Elevation [1] m (ft)	Allowable Bearing Pressure [2] kPa (Tsf)
Abutment 1	Left Cap	129.53 (425)	191.5 (2)
	Center Cap	128.31 (421)	191.5 (2)
	Right Cap	127.10 (417)	191.5 (2)
Abutment 6	Left Cap	124.66 (409)	191.5 (2)
	Center Cap	123.13 (404)	191.5 (2)
	Right Cap	121.61 (399)	191.5 (2)
		120.09 (394)	191.5 (2)

Notes:
1) Bottom of Footing Elevations obtained from As-Built Foundation Plans dated August 7, 1984.
2) Allowable Bearing Pressure obtained from APS-PGR Memo dated December 8, 1998.

Table 6
Pile Data Table
Widened Structure - East Side (1986)

Location	Pile Type 2.44 m (8 ft) diameter column (shaft)	Design Load [1] kN (Tons)	Cut-Off Elevation [2] m (ft)	Bottom of Pier Shaft Elevation [3] m (ft)
Pier 2	Single Column	9741 (1095)	107.89 (354)	96.31 (316)
Pier 3	Single Column	11253 (1265)	93.26 (306)	78.63 (258)
Pier 4	Single Column	11431 (1285)	90.83 (298)	78.03 (256)
Pier 5	Single Column	9652 (1085)	105.46 (346)	92.35 (303)

Notes:
1) Design Loads obtained from APS-PGR Memo dated December 8, 1998.
2) Cut-Off Elevations obtained from As-Built Bent Details Sheet dated August 7, 1984.
3) Bottom of Pier Shaft Elevations obtained from As-Built Bent Details Sheet dated August 7, 1984.

Preliminary Foundation Recommendations for the proposed left bridge widening

The proposed Abutments 1 and 6 can be supported by spread footings. Bottom of footing elevations and abutment widths are required to analyze and evaluate for the final foundation recommendations. 191.52 kPa (2 Tsf) allowable bearing pressure can be utilized if footing width and bottom of footing elevation match existing As-Built conditions. The proposed abutment footings should be founded in 95% R.C. compacted embankment in order to utilize the above recommendations.

Large diameter Cast-In-Drilled-Hole (CIDH) piles can support the proposed Piers 2 through 5. According to the Planning Study dated 05/18/01 prepared by Structure Design Section 15, the proposed widening for the left bridge consists of 2.44x2.44 m (square) two columns Pier (refer to Piers 2 through 5). As per the preliminary design layout, we're recommending use of rounded-CIDH for the portion below cut-off elevation for ease of construction. One important aspect of the rounded-CIDH piles is that temporary casing might be required to prevent caving and sloughing of material during the installation of CIDH piles for Piers 2 through 5.

Additional Field Investigation

To verify the geologic conditions of the foundation materials, it is recommended that one to two 30.5 meters (100 ft) rotary borings be completed at the proposed support locations. The additional field investigation (drilling) will provide information pertaining to the geology (detail descriptions of bedrock "rock" conditions), provide present groundwater surface information for the design and construction procedures for the CIDH piles. Furthermore, the updated data can be utilized to provide corrosion and seismic analyses.

A request for final foundation recommendations (FR) should include Foundation and General Plans for the proposed widened structure's estimated loads. The District Project Manager should be aware that several permits may be required to commence drilling and should plan to consider time required by the district to obtain permits. Permits such as road closure, Fish and Game permits, permits to be on private property (if required), utility clearance, and any other environmental issues/permits may be required for drilling at the site, and in the district/county. If a site hazardous assessment report for soil and groundwater contamination is available, it should be communicated to our office before any drilling starts.

Estimated Structure Foundation Branch Time and Duration Required

The following resource estimate is issued pursuant to "Memo To Designers" I-35 (revised 3/98). The estimated time and duration are based upon the following assumptions:

1) The Division of Structure Design will provide all information required by the Structure Foundations Branch B - South to complete evaluation.
2) The Department will provide the appropriate resources (funding, staff and equipment) for the project.
3) The District will provide the necessary permits and clearance for drilling in this County.

Table 7: Resource Estimate

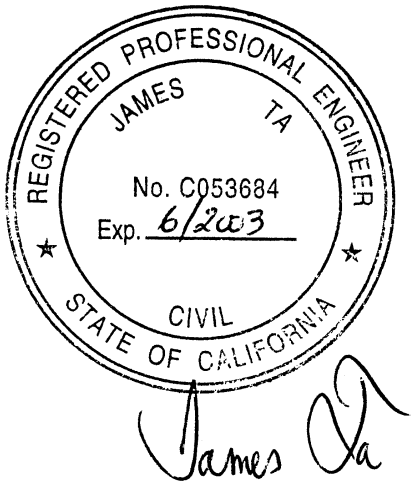
Request Type	OGD-S Estimated Hours [1]	OGD-S Estimated Duration [1]
FR (WBS 215)	500	12 weeks

Note:
1) The estimated hours and estimated duration was obtained from the Preliminary Geologic Recommendations and Resources Estimate for Advance Planning Study prepared by M. Luqman dated December 8, 1998.

Limitations

The analyses and preliminary recommendations contained in this Memorandum are based on the data obtained from review of available As-Built Plans, As-Built Log of Test Borings and Foundation Recommendations/Reports from the existing structure. Our recommendations are based on information available at this time. Further detailed evaluations and final recommendations will be provided upon receiving structure load demands from designer and completion of our field investigation.

Any questions regarding the above recommendations should be directed to the attention of James Ta at (916) 227-5389 (CALNET 498-5389) or Muhammad Luqman (916) 227-5390.



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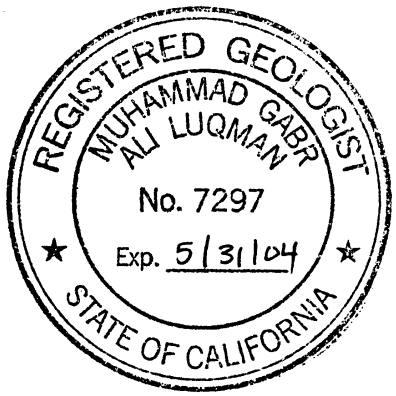

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c: James Chai – OGD-South
Gustavo Hernandez (APCE)
RGES.29
Bridge File